



General

Guideline Title

Guidelines for the minimally invasive treatment of adrenal pathology.

Bibliographic Source(s)

Society of American Gastrointestinal Endoscopic Surgeons (SAGES). Guidelines for the minimally invasive treatment of adrenal pathology. Los Angeles (CA): Society of American Gastrointestinal Endoscopic Surgeons (SAGES); 2013 Feb. 27 p. [164 references]

Guideline Status

This is the current release of the guideline.

Regulatory Alert

FDA Warning/Regulatory Alert

Note from the National Guideline Clearinghouse: This guideline references a drug(s) for which important revised regulatory and/or warning information has been released.

- [December 14, 2016 – General anesthetic and sedation drugs](#) : The U.S. Food and Drug Administration (FDA) is warning that repeated or lengthy use of general anesthetic and sedation drugs during surgeries or procedures in children younger than 3 years or in pregnant women during their third trimester may affect the development of children's brains. Consistent with animal studies, recent human studies suggest that a single, relatively short exposure to general anesthetic and sedation drugs in infants or toddlers is unlikely to have negative effects on behavior or learning. However, further research is needed to fully characterize how early life anesthetic exposure affects children's brain development.

Recommendations

Major Recommendations

Definitions of the levels of evidence (+, ++, +++, +++) and the grades of the recommendations (weak or strong) are provided at the end of the "Major Recommendations" field.

Outcomes of Minimally Invasive Adrenalectomy

Minimally invasive adrenalectomy is associated with less postoperative pain, shorter hospital stay, earlier recovery, and similar long-term outcomes

compared with open surgery and has been established as the preferred approach to all non-primary adrenal cancer pathology (+++, strong).

Adrenalectomy Techniques

Several approaches to laparoscopic adrenalectomy (LA) have been described in the literature. Surgeons should choose the approach they are most familiar with, have had training in, and have the best patient outcomes with (+++, strong).

Surgeons should also take into consideration that in specific clinical circumstances some approaches may be more beneficial than others:

- In patients with previous abdominal surgery, a retroperitoneal approach may be associated with less operative time and fewer complications (++, weak).
- For bilateral adrenalectomies, the posterior retroperitoneal approach may be advantageous, as it eliminates patient repositioning during the case (++, weak).
- In morbidly obese patients (BMI >35 kg/m²) and for large tumors (>6 cm), the lateral transabdominal approach may increase the feasibility of the procedure compared with the other approaches (++, weak).

Robotic Adrenalectomy (RA)

Compared with standard laparoscopic techniques, robotic adrenalectomy may offer advantages for large tumors and in morbidly obese patients (+, weak). However, given the increased cost, longer operative times, and lack of clear patient outcome benefits using this technique, additional higher quality evidence is needed before a firm recommendation can be provided.

Single Port Adrenalectomy

Based on the available evidence, single port adrenalectomy is feasible and safe when undertaken by an experienced surgeon but offers little if any advantage over other standard laparoscopic approaches to adrenalectomy. Additional, better quality evidence is needed before this approach can be recommended (+, weak).

Partial Adrenalectomy

Partial adrenalectomy is safe and feasible in the hands of appropriately trained surgeons. For patients requiring bilateral adrenalectomy, such as for hereditary pheochromocytomas, laparoscopic cortical sparing surgery may be the procedure of choice (++, weak).

Additional evidence is needed before a recommendation can be provided for partial adrenalectomy of single gland, non-hereditary tumors.

Method and Timing for Taking the Adrenal Vein

The classic teaching for early vein control during open adrenalectomy has not been confirmed for laparoscopic adrenalectomy, because patient outcomes do not appear to be affected by early versus late ligation. Thus, the type and timing of adrenal vein control depends on surgeon preference and the specific anatomic variables associated with each case (+, weak).

Laparoscopic Adrenalectomy for Suspected or Proven Adrenal Cortical Carcinoma and Adrenal Metastases

For adrenal cortical carcinoma (ACC), the best determinant of patient outcomes is an appropriate oncologic resection that includes *en bloc* resection of any contiguous involved structures and regional lymphadenectomy. Thus, an open approach to resection may be best. If a laparoscopic approach is chosen (due to unknown malignancy status preoperatively or suspected early stage ACC), conversion to open surgery is strongly recommended when difficult dissection is encountered due to tumor adhesion or invasion or enlarged lymph nodes are seen (++, strong).

Adrenal Metastases

Solitary metastases to the adrenal gland without evidence of local invasion can be approached laparoscopically by a surgeon skilled in advanced laparoscopy and adrenal surgery (+, weak). If local invasion is found intraoperatively, conversion to an open approach is warranted (+, strong).

Laparoscopic Adrenalectomy in Large Adrenal Masses

Large adrenal tumors without pre- or intraoperative evidence of primary adrenal cortical carcinoma can be approached laparoscopically by a surgeon skilled in advanced laparoscopy and adrenal surgery (+, weak). Laparoscopic adrenalectomy for larger tumors may be associated with increased operating room times, blood loss, and conversion rate to open surgery (+, weak). If there is any evidence for carcinoma found intraoperatively, conversion to an open approach is warranted (should be strongly considered) (+, strong).

Pheochromocytoma

Preoperative Care

Before laparoscopic adrenalectomy for pheochromocytoma, alpha adrenergic receptor blockade should be considered in all patients. When used preoperatively, alpha blockade should be continued until signs of orthostatic hypotension are evident (+++, weak). Short acting alpha blockers may be preferable to long acting ones. Beta blockade should also be considered in appropriately selected patients and should only be instituted following adequate alpha blockade (+++, weak).

Intraoperative Management

Invasive hemodynamic monitoring should be considered during LA for pheochromocytomas (+++, strong). To minimize hemodynamic instability due to catecholamine release during surgery, minimization of direct manipulation or compression of the adrenal gland is necessary (+++, strong). Early ligation of the vein does not prevent hemodynamic instability (+, weak). Due to the added challenge of intraoperative hemodynamic variability, frequent communication between the surgical and anesthesia teams is important for optimal perioperative outcomes.

Postoperative Management

Due to the potential for hemodynamic instability after pheochromocytoma resection, all patients should be closely monitored in the early postoperative phase (+++, strong). Capsular disruptions of the adrenal gland during surgery should be avoided to minimize the risk of disease recurrence. (+, weak). Given the lack of clear predictors of malignancy to detect recurrences, patients with pheochromocytoma should be monitored long term with blood pressure measurements and serum and/or urinary metanephrine levels (+++, strong).

Learning Curve

Minimally invasive adrenalectomy is associated with a learning curve that may be difficult to overcome given the paucity of these cases in general practice. Dedicated, advanced training should be pursued by surgeons unfamiliar with this technique. Until proficiency with laparoscopic adrenalectomy is attained, consideration should be given to referral to a center with expertise in minimally-invasive adrenal surgery (+++, strong).

Definitions:

Quality of Evidence

Both the quality of the evidence and the strength of the recommendation for each of the guidelines were assessed according to the Grading of Recommendations Assessment, Development and Evaluation (GRADE) system.* There is a 4-tiered system for quality of evidence:

Quality of Evidence	Definition	Symbol Used
High quality	Further research is very unlikely to alter confidence in the estimate of impact	++++
Moderate quality	Further research is likely to alter confidence in the estimate of impact and may change the estimate	+++
Low quality	Further research is very likely to alter confidence in the estimate of impact and is likely to change the estimate	++
Very low quality	Any estimate of impact is uncertain	+

Strength of Recommendations

There is a 2-tiered system for strength of recommendation (weak or strong):

Strong: It is very certain that benefit exceeds risk for the option considered

Weak: Risk and benefit well balanced, patients in differing clinical situations would make different choices, or benefits available but not certain.

*Adapted from Guyatt GH, Oxman AD, Vist GE, et al; GRADE Working Group. GRADE: An emerging consensus on rating quality of evidence and strength of recommendations. BMJ 2008; 336:924-6.

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Adrenal disease

Guideline Category

Assessment of Therapeutic Effectiveness

Evaluation

Management

Risk Assessment

Treatment

Clinical Specialty

Endocrinology

Oncology

Surgery

Urology

Intended Users

Patients

Physicians

Guideline Objective(s)

To provide systematically developed statements to educate and guide the surgeon (and patient) in the appropriate use of minimally invasive techniques for the treatment of adrenal disease

Target Population

Patients with adrenal disease, including functional and nonfunctional adrenal tumors

Note: A description of the presenting symptoms of adrenal disease and their diagnostic workup is beyond the scope of this guideline. The focus of the current guideline begins after the decision to perform an adrenalectomy has been made.

Interventions and Practices Considered

1. Lateral transabdominal adrenalectomy (LTA)
2. Posterior retroperitoneoscopic adrenalectomy (PRA)
3. Anterior transabdominal adrenalectomy (ATA)
4. Lateral retroperitoneoscopic adrenalectomy (LPA)
5. Robotic adrenalectomy (RA)
6. Single port adrenalectomy

7. Partial adrenalectomy
8. Laparoscopy

Major Outcomes Considered

- Survival
- Local and overall recurrence
- Postoperative pain
- Time of convalescence
- Cosmesis

Methodology

Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

A systematic literature search was performed on MEDLINE in April 2011. The search strategy was limited to adult English language articles (shown in Figure 1 in the original document).

The literature search identified 79 relevant articles. The abstracts were reviewed by four committee members and divided into the following categories:

- Randomized studies, meta-analyses, and systematic reviews
- Prospective studies
- Retrospective studies
- Case reports
- Review articles

Randomized controlled trials, meta-analyses, and systematic reviews were selected for further review along with prospective and retrospective studies when a higher level of evidence was lacking. For inclusion, prospective and retrospective studies had to report outcomes on at least 50 adrenalectomies. Studies with smaller samples were considered when additional evidence was lacking. The most recent reviews were also included. All case reports, old reviews, and smaller studies were excluded. Duplicate publications or patient populations were considered only once. Whenever the available evidence from Level I studies was considered to be adequate, lower evidence level studies were not considered. Newer relevant articles that were published after the original literature search date during the drafting of this guideline were also included. According to these exclusion criteria, 70 articles were selected for review.

Number of Source Documents

164 articles

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Quality of Evidence

Both the quality of the evidence and the strength of the recommendation for each of the guidelines were assessed according to the Grading of Recommendations Assessment, Development and Evaluation (GRADE) system.* There is a 4-tiered system for quality of evidence:

Quality of Evidence	Definition	Symbol Used
High quality	Further research is very unlikely to alter confidence in the estimate of impact	++++
Moderate quality	Further research is likely to alter confidence in the estimate of impact and may change the estimate	+++
Low quality	Further research is very likely to alter confidence in the estimate of impact and is likely to change the estimate	++
Very low quality	Any estimate of impact is uncertain	+

*Adapted from Guyatt GH, Oxman AD, Vist GE, et al; GRADE Working Group. GRADE: An emerging consensus on rating quality of evidence and strength of recommendations. BMJ 2008; 336:924-6.

Methods Used to Analyze the Evidence

Systematic Review

Description of the Methods Used to Analyze the Evidence

The reviewers graded the level of evidence and searched the bibliography of each article for additional articles that may have been missed during the original search. Additional relevant articles (n=94) were obtained and included in the review for grading. A total of 164 graded articles relevant to this guideline were included in this review. To facilitate the review by multiple reviewers, these articles were divided into the following topics and distributed to the reviewers:

- Minimally invasive adrenalectomy outcomes and comparison to open
- Description and comparison of various minimally invasive surgery (MIS) adrenalectomy techniques
- Management of large adrenal tumors
- Management of adrenal cortical carcinoma and metastatic disease
- Management of pheochromocytoma
- Other circumstances (i.e., partial and bilateral adrenalectomy, etc.)

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

The recommendations included in this guideline were devised based on the reviewers' grading of all articles.

Rating Scheme for the Strength of the Recommendations

Both the quality of the evidence and the strength of the recommendation for each of the guidelines were assessed according to the Grading of Recommendations Assessment, Development and Evaluation (GRADE) system.*

There is a 2-tiered system for strength of recommendation (weak or strong):

Strength of Recommendations

Strong: It is very certain that benefit exceeds risk for the option considered

Weak: Risk and benefit well balanced, patients in differing clinical situations would make different choices, or benefits available but not certain

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

Internal Peer Review

Description of Method of Guideline Validation

Guidelines were developed under the auspices of Society of American Gastrointestinal and Endoscopic Surgeons (SAGES), the guidelines committee, and were approved by the Board of Governors. The recommendations of each guideline underwent multidisciplinary review. The recommendations of each guideline undergo multidisciplinary review and are considered valid at the time of production based on the data available. New developments in medical research and practice pertinent to each guideline are reviewed, and guidelines will be periodically updated.

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

- Appropriate use of minimally invasive techniques for the treatment of adrenal disease
- Comparative studies with other laparoscopic approaches have demonstrated a small yet significant benefit in pain medication requirement, time to oral intake, length of hospital stay, and overall convalescence for posterior retroperitoneoscopic adrenalectomy (PRA)

Potential Harms

- Typically, the lateral retroperitoneoscopic adrenalectomy procedure has slightly longer operating times and requires more ports than laparoscopic adrenalectomy (LA) or posterior retroperitoneoscopic adrenalectomy (PRA)
- Robotic adrenalectomy includes increased cost, longer operative times, and lack of clear patient outcome benefits.
- LA of large tumors has been shown to be an independent risk factor for longer operating times, more blood loss, longer hospital stay, and a higher conversion rate to open surgery

Pheochromocytoma Resection

- In addition to the problems associated with catecholamine liberation, large size and prominent vascularity compound the challenges of removing pheochromocytomas. Compared with other indications for adrenalectomy, both laparoscopic and open resection of pheochromocytomas has been associated with longer operative times, higher complication rates, greater blood loss and longer hospitalization.
- In general, these tumors tend to be larger than other functional and nonfunctional adrenal lesions and often have a large number of arterial and venous tributaries that bleed with minimal manipulation. The renal vessels must be carefully identified and protected to avoid inadvertent injury during dissection.
- Intraoperative hypertension and hypotension can occur during intraoperative management, leading to hemodynamic instability.

Qualifying Statements

Qualifying Statements

Clinical practice guidelines are intended to indicate the best available approach to medical conditions as established by a systematic review of available data and expert opinion. The approach suggested might not be the only acceptable approach given the complexity of the healthcare environment. These guidelines are intended to be flexible, as the surgeon must choose the approach best suited to the individual patient and variables in existence at the moment of decision. These guidelines are applicable to all physicians who are appropriately credentialed and address the clinical situation in question, regardless of specialty.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

Living with Illness

IOM Domain

Effectiveness

Patient-centeredness

Identifying Information and Availability

Bibliographic Source(s)

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Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2013 Feb

Guideline Developer(s)

Society of American Gastrointestinal and Endoscopic Surgeons - Medical Specialty Society

Source(s) of Funding

Society of American Gastrointestinal and Endoscopic Surgeons (SAGES)

Guideline Committee

Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) Guideline Committee

Composition of Group That Authored the Guideline

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Financial Disclosures/Conflicts of Interest

Society of American Gastrointestinal Endoscopic Surgeons (SAGES) leadership members, committee members, and guidelines authors disclose real and potential conflicts on a yearly basis and whenever they change, and real and potential conflicts are mitigated through mechanisms approved by the SAGES Conflict of Interest Task Force.

Guideline Status

This is the current release of the guideline.

Guideline Availability

Electronic copies: Available from the [Society of American Gastrointestinal and Endoscopic Surgeons \(SAGES\) Web site](#)

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Print copies: Available from the Society of American Gastrointestinal Endoscopic Surgeons (SAGES), 11300 W. Olympic Blvd., Suite 600, Los Angeles, CA 90064; Web site: www.sages.org .

Availability of Companion Documents

None available

Patient Resources

None available

NGC Status

This NGC summary was completed by ECRI Institute on May 3, 2013. This summary was updated by ECRI Institute on February 15, 2017 following the U.S. Food and Drug Administration advisory on general anesthetic and sedation drugs.

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